What's in Your Computer? An Instructional Module on Replacing Your Legacy Windows Operating System

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Abstract: When Microsoft ended Windows XP support in 2014 it left many computer users without a reliable, cost effective computer operating system. Linux Mint can fulfill this need and extend the life of older computer hardware. Instructional design theories for effective teaching material utilize various combinations of techniques for creating educational modules. Visual and auditory presentations and the balance between these mediums are factors that lead to effective cognitive design. I developed a web based instructional module utilizing Wix to deliver a user-friendly interface. Training material needs to be geared towards the audience. In this introductory teaching module I minimized technical jargon to not overwhelm the participant. Step-by-step instruction is provided in the module along with written guidelines and audio narration. Pretest and post tests are administered to each participant to assess learning effectiveness. My challenge as an instructional designer is to make learning material engaging and informative. This instructional design project created an online tutorial for Outreach College Students on how to install and configure a free/open source operating system on a computer. Effectively utilizing the appropriate tools was my priority consideration and the key to effective design of my instructional module.

Introduction

Modern computer technology changes so rapidly that it seems like our computers become outdated within a few years. New hardware and software are released constantly. Does this mean that our older systems are obsolete and no longer useful? The proliferation of new hardware raises questions of e-waste disposal. Do we stress our landfills by dumping our hardware into the trash or can their life be extended through re-purposing?
The Windows XP computer operating system, which was released in 2002, remains popular today as it is easy to use, reliable, and requires very few computer resources. As of April 2014, support for Windows XP was discontinued which means that security and technical updates are no longer provided by Microsoft. Linux is a Free / Open Source operating system, supported by its own community of developers and is also reliable, easy to use, and requires minimal resources. Linux is also virus resistant since it is not a primary target of malicious hackers. Users familiar with Windows XP could install Linux as a way to re-purpose and extend the usefulness of their computers.

A web search for "how to install Linux?" reveals literally millions of websites purporting to answer the question. For the non-technical computer user this can be very intimidating as most are written in very technical jargon, this project was done to fulfill the need for a simplified instructional guide for converting, installing, and configuring a legacy Windows XP computer with a current Linux Mint operating system and free/open source software applications.

The purpose of this instructional design project was to develop and evaluate an instructional module on the process of converting a legacy Windows laptop operating system to a Free / Open source Linux operating system for adult students at the University of Hawaii at Manoa Outreach College.

Literature Review

Technological tools and application are deeply embedded in the lives of contemporary adults and the skills necessary to use these technologies vary widely among these adults (Smith 2010). Smith's study examined the use of technology, such as personal computers, and correlated literary proficiency with computer usage proficiency. The study showed 14% of the population as "Below Basic" level, 29% at the "Basic" level, 44% at the "Intermediate" level, and 13% at the "Proficient" level. Combining the lower three levels indicates 87% of the adult population surveyed were less than proficient in computer skills.

In 2002 Microsoft released the Windows XP operating system. This operating system became one of the most popular among PC users and achieved a peak of over 76% market share (www.operatingsystems.com/Windows-XP). Cavanagh (2013) emphasized that Microsoft's end of support for Windows XP could pose big technological and financial challenges nationwide. He also noted that software providers were unlikely to continue creating products that could be used on XP. It is estimated that current Windows XP users range from 18 to 30% of all Windows computers that are at least five years old (www.cnet.com/news/micrososft-to-windows-xp). Computer owners who have computers from the early and mid-2000's could conceivably be older adults, most likely using Windows XP and reluctant to change because of cost for new software and hardware, the complexity of a newer operating system, and a fear of undertaking new technology.

The Linux Mint (2014) website describes Linux Mint as a modern, powerful and easy to use operating system. It is free of cost, open source, and requires very little maintenance. Linux Mint is one of the many operating systems available that can replace Windows XP and one of the easier ones to install thus making it an ideal candidate for novice computer users to experiment with and the primary focus of this instructional module.

The acceptance of open-source software versus proprietary software along with the benefits and barriers to adopting open-source software was examined by Nagy, Yassin, and Bhattache (2010). They note that businesses looking to reduce licensing fees of proprietary software and the liabilities of illegal software use often turn to open-source solutions, although proprietary software proponents try to dissuade the adoption of open-

source software through the tactic of Fear, Uncertainty, and Doubt (FUD). The authors examined these perceived problems and looked to remedies to alleviate these barriers.

In creating instructional materials for a wide audience instructional designers need to consider student learning capabilities. Brody, Chan, & Caputi (2010) refuted the stereotype that older learners avoided technology and were incapable of its use and found that older students have similar attitudes towards computers and technology as their younger counterparts. They observed that older students may require ample time to develop these new skills and that teaching technology should be geared towards these goals. In a study of older computer users, Hernandez-Encuentra, Pousada, & Gomez-Zuniga (2009) found that information and computer technology (IT) was not a tool for change but rather a tool for conservation of old functions. The researchers identified the need for technology to adapt to the users rather than users adapting to the technology. What techniques should the instructional designer use to create effective teaching material? In developing a training module the designer must realize that certain combinations of media are more effective for learning (Swann, 2014). Swann emphasizes that visual and auditory presentations and the balance between these mediums are factors that lead to effective cognitive design. Wang, (2009) took a different development approach and concluded that the constructive approach to instructional design is more effective than the traditional ADDIE design model. Wang also emphasized that more research beyond his study was needed to determine the effectiveness and usefulness of constructivist learning environments.

Wang's (2009) study on utilizing a constructivist learning environment for technology training reveals potential for an effective learning design technique. Are there additional factors that influence instructional design? Janzen, Perry, and Edwards (2011) explored seven definitive questions on how smaller interactive parts of the cognitive process influence instructional design. Questions about learning, memory, relevance, and structure are all important factors in an instructional design project. One of the more pertinent journal articles was authored by Gardner and Jeon (2010). The authors studied task-centered instruction as it applied to real-world situations. The application of real tasks made the instruction more meaningful as participants related more closely to the educational purpose of the module.

Designing an instructional module is a challenging process. How does the designer know that his design is the most effective for his target audience? How can design theory be applied to a module? Roytek (2010) examined the instructional design process with emphasis on web design technologies and found over forty-seven types of methodologies used along with an increase in the use of technology to increase learning efficiency. A study by Wright, Shumway, Terry, & Bartholomew (2012) searched for the best methods to teach computer software to junior high school students. These same methods can be applied to adult learners, although the best style of learning and teaching may differ in older adults.

The abundance of leaning design theories and techniques offers the instructional designer tools for creating effective educational resources. These tools can be used to overcome the trend Glass (2011) noted that although "old hardware becomes obsolete: Old software

continues to go into production every night." Linux Mint could reverse the trend of "old hardware becoming obsolete" since Linux Mint does not require a computer with the fastest processor, or vast amounts of random access memory (RAM). Linux works just fine on "obsolete hardware" and will extend the life of a computer for many more years.

Project Design & Development

The literature review revealed that technology is very pervasive in the lives of today's adult population. And while technology abounds, the level of computer literacy is low. Many adults know how to browse the Internet, send email, perform light word processing and play games. Beyond those tasks many adult computer users are deficient in the technological aspects of computer functions. The termination of support for Windows XP operating system in 2014 left many computer users worried about tech support and security updates for their Windows XP computers. Without a viable operating system would they need to purchase new operating system software and new computer equipment compatible with newer operating systems? This dilemma required an efficient and cost-effective solution that even novice computer users could accomplish.

After working with free/open source software and the Linux operating system in a previous Educational Technology (ETEC) class I saw the potential of Linux to replace aging proprietary operating systems and extend the life of older hardware. In order to teach computer technology a hands-on demonstration is probably most effective. In the absence of one-on-one instruction, student tutorials through an online website with visual and audio instruction could be equally effective.

Prior to selecting Wix as the vehicle for the module I investigated website development with Blendspace and Schoology. Both programs are Learning Management Systems (LMS) developed to help instructors and educators build and manage courses. Both products were very good for archiving lesson material, monitoring and assessing student progress, and providing the instructor a repository for maintaining lesson plans and instructional blocks. Schoology's interface was plain and very simple while Blendspace seemed more visually appealing.

Blendspace and Schoology have easy to use interfaces and allow instructors to drag and drop their course resources into a specific course site. Blendspace and Schoology also had the capability to generate self-assessments. Initially this seemed like the best way to create my module since I could build the lessons and embed self-assessments within the module. As I developed the self-assessments I found that both systems were limited in their student feedback systems. Blendspace and Schoology only partially met my module requirements. Other self-assessment tools such as Google Docs could not be embedded into Blendspace or Schoology so both systems became very limited.

After numerous attempts in trying to develop my instructional module with these products and not achieving the results I desired I switched to Wix. Wix is a free, website hosting platform that is highly customizable. Wix essentially offered a "blank slate" where I could design my module and embed tests and surveys. Wix's many different options included customizing module and website appearances, and embedding user self-

assessments created in Google Docs. Wix also allows audio tracks to be embedded along with a written narrative, thus giving students visual and aural presentations. Audio narration tracks were created and saved as MP3 files using Audacity, a free/open source audio editing application. Hypertext Markup Language (HTML) coding skills are not required to use Wix which make the design interface very easy to use. Web site changes are easily made, saved, and published for rapid site viewing and design feedback. Visual appeal of the web site can be as simple or elaborate as required making the flexibility of Wix a very valuable instructional design tool.

One of the essential considerations in designing an instructional module is to create a product that encompasses different learning styles. Figure 1 is the modules homepage depicting a simple uncluttered layout with the navigation bar at the top of the page and a "Next" button to proceed to the next page.

Figure 1. Website homepage.

Website navigation is further enhanced by dropdown menus as seen in Figure 2 along with a "Click to play audio" button. The audio button functions as a Start/Pause button for the embedded lesson narration.

Figure 2. Website navigation.

Lesson 1 begins with an audio narration and bullet statements on computer technology and changes in hardware and software. (Figure 3) The introduction continues by explaining the merits of re-purposing older hardware through software upgrades.

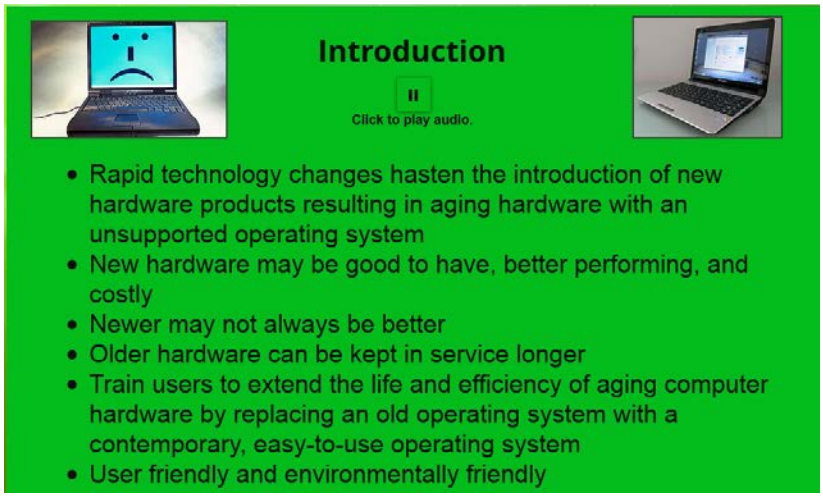

Figure 3. Lesson 1 introduction.

Module objectives are displayed in Figure 4. An audio narration on the webpage further explains the objectives.

Figure 4. Module objectives.

A glossary (Figure 5) of computer terminology used in the module is included for student review.

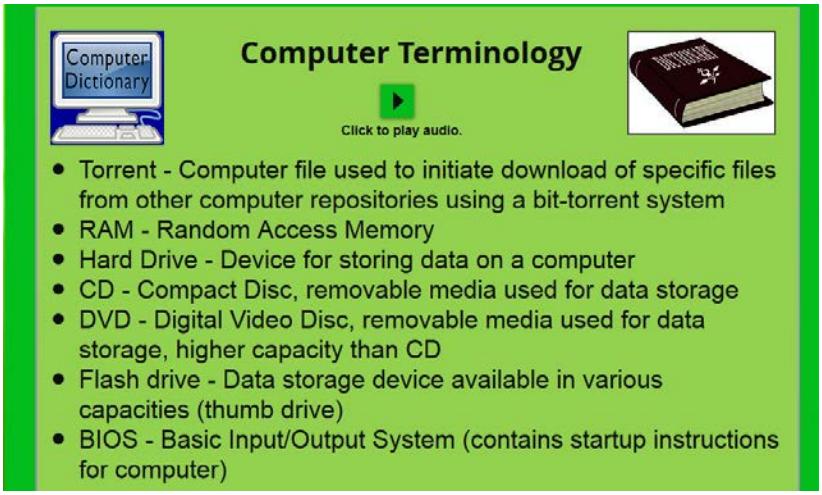

Figure 5. Glossary.

Summaries on the background and status of Windows XP and Linux are presented in Figures 6 and 7. Since many users may not be familiar with Linux, information on this operating system is provided to acquaint the user with its resources and benefits.

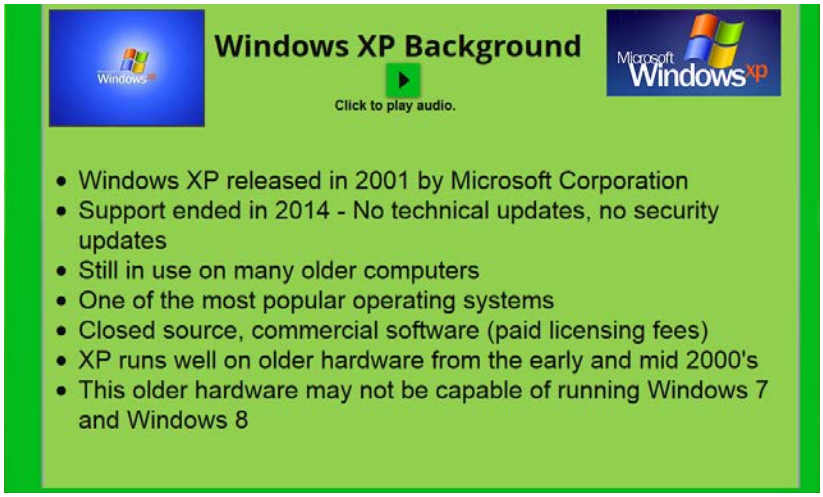

Figure 6. Windows XP background.

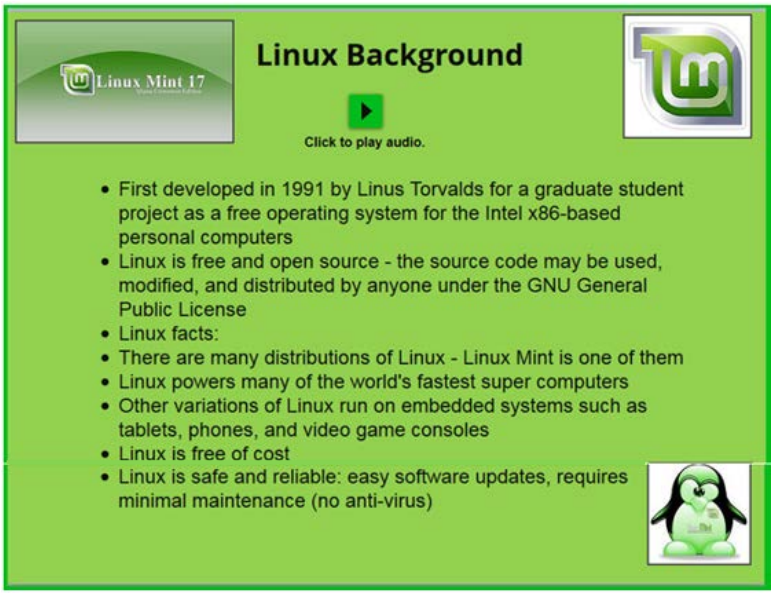

Figure 7. Linux background.

Figures 8 and 9 display the initial pages of the practical instructional process. Users are shown the steps involved in downloading Linux Mint and installing the new operating system on a computer. Step-by-step instructions are provided with screenshots of the actual Linux Mint website. Red arrows are added for clarification and visual emphasis.

Figure 8. Step-by-step Instructions.

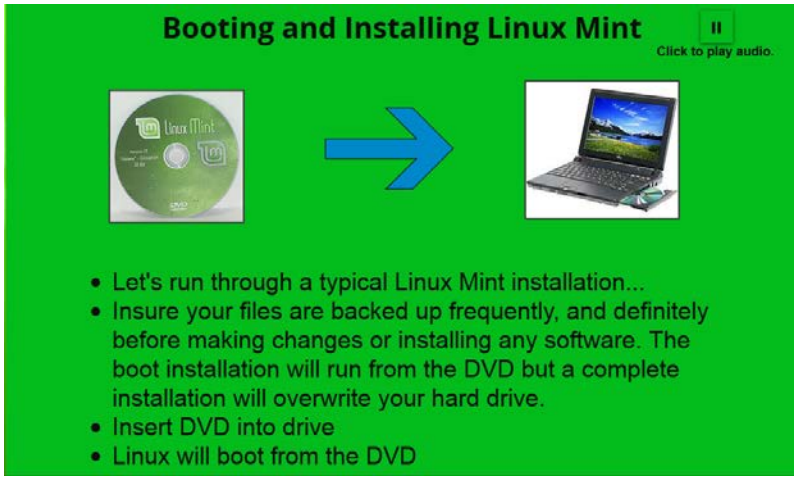

Figure 9. Installation Instructions.

Figure 10 illustrates the instructions on selecting and installing productivity applications through the Linux Software Manager. The module continues through this last lesson by highlighting some of the more popular software titles for word processing, database, spreadsheets, graphics, and image manipulation.

Figure 10. Productivity software.

Future module improvements would change the website layout and navigation of lesson pages. Figure 11 is a mock-up of the instructional module using a dedicated learning management system. A table of contents and learning points can be accessed from buttons in the lower left corner of the lesson page. Page advancement or reversal is controlled by the outward pointing triangles in the lower center of the page. Volume controls and an option to display closed captioning are accessible from buttons in the lower right corner of the screen.

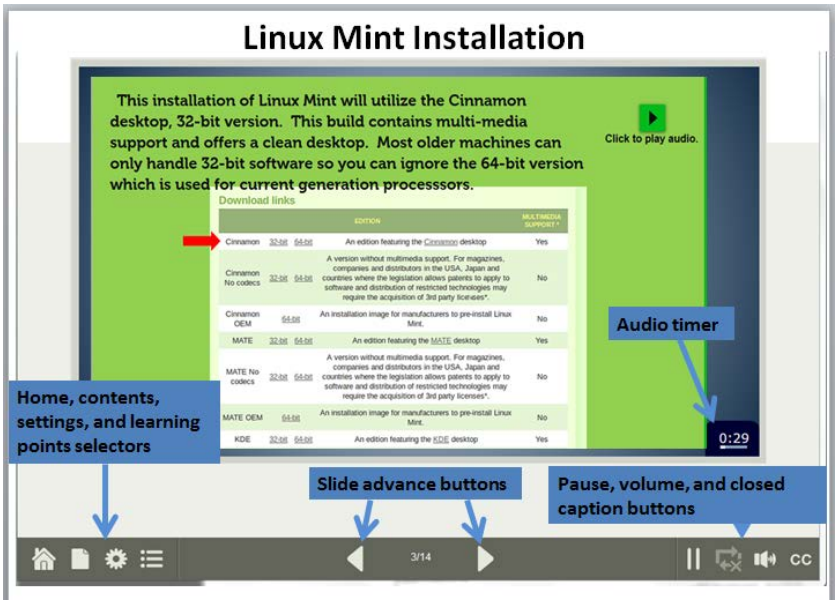

Figure 11. Future module layout

The appendices contain examples of instruments developed as part of the instructional design process for this project. These instruments would be necessary for project implementation if the instructional module was deployed in a live environment. Appendix A is a sample recruitment flyer. Appendix B is a sample of a participant consent form. Appendix C displays sample pre-survey questions. Appendix D illustrates sample pretest and posttest questions, and Appendix E shows sample post-survey questions.

Conclusion

In future development of the module I would incorporate more immediate self-assessment feedback with an online confirmation. Streamlining the lesson flow, improving site navigation, and expanding into other instructional areas will improve the module. Providing continual on-going product improvement is necessary to maintain design effectiveness and user interest.

In my instructional module I've presented an introduction to computer software modification. As a stand-alone product the module provides the user with knowledge to successfully install and convert a computer to Linux. In an ideal environment I would supplement the module using additional tools to reinforce learning. This may include: a) Hands-on training sessions for in-depth software manipulation; b) Provide individual computers for participant practice (or create virtual machines); and c) have pre-configured computers with additional distributions/versions of Linux for familiarization and experimentation.

Technology keeps changing at an ever increasing rate as the lifecycle of hardware and software keeps decreasing. Keeping up with rapidly changing technology requires financial expenditure for new equipment. Many people do not have unlimited funds for acquisition of the latest and greatest hardware and software. We must consider the efficacy of older but still very viable hardware. Re-purposing this equipment rather than creating tons of e-waste is environmentally friendly as the useful life of older equipment is extended for many years. Providing a simple and cost-effective method of upgrading aging computer equipment to function in a contemporary digital world can prove beneficial for both users and our environment.

Appendix A

Recruitment Flyer

The University of Hawai`i is conducting a study on:

An Instructional Module on Replacing Your

Legacy Windows Operating System

Are you student in the University of Hawaii Outreach College?

If the answer is **YES**...

Mr. Dal Wong would like to invite you to participate in a research study.

The purpose of this study is to analyze the effectiveness of a computer based instructional module on replacing computer operating systems. The study is a class requirement for an independent research project in the University of Hawai`i College of Education, Learning Design and Technology Department.

- Study visits (1) will be accomplished through an online module.
- Results of the study will be kept confidential and no personally identifiable information will be kept.

To learn more about the study, please email Dal Wong at dalwyncw@hawaii.edu

Appendix B

Consent Form

University of Hawai'i

Consent to Participate in Research Project:
An Instructional Module on Replacing Your Legacy Windows Operating System

My name is Dal Wong. I am a graduate student at the University of Hawai'i at Manoa (UH), in the Department of Learning Design and Technology. I am conducting research for an individual class project. My interest is in reducing e-waste through re-purposing older computer hardware through education and training. The purpose of this research project is to evaluate an instructional module on replacing your legacy Windows operating system. I am asking you to participate in this project because you are an adult computer user and you are also enrolled in the University of Hawaii Outreach College.

What activities will you do in the study and how long will the activities last? If you participate, I will have you take my instructional module. The module will last for about one hour. The module consists of a pre-survey, a pretest, instructional presentation, a posttest, and a post-survey. Your answers to the surveys and tests are recorded on a digital spreadsheet so I can later type a written record of participant reactions to the module. I will evaluate the information from the surveys and tests. If you participate, you will be one of a total of approximately fifteen Outreach College students who will take the module individually.

Benefits and Risks: You may benefit from this project by learning how to replace the operating system on your computer and even extend the useful life of older hardware. The results of this project might help me learn more about adult college students' ability to learn about upgrading a computer. I believe there is little or no risk to you in participating in this project. There is a possibility you may become uncomfortable or stressed by receiving online virtual instruction. If that happens, you may take a break, or stop the module. You may also withdraw from the project altogether.

Confidentiality and Privacy: I will keep all information from the module surveys and tests in a safe place. Only my course instructor and I will have access to the information. The University of Hawaii Human Studies Program has the right to review research records for this study.

When I report the results of my research project in my typed papers, I will not use your name or any other personal information that would identify you. No data will be presented outside of the class environment.

Voluntary Participation: Participation in this research project is voluntary. You are free to choose to participate or not to participate in this project. At any point during this project, you can withdraw your permission without any loss of benefits.

Questions: If you have any questions about this project, please contact me via e-mail (dalwyncw@hawaii.edu).

If you have any questions about your rights in this project, you can contact the University of Hawaii, Human Studies Program, by phone at (808) 956-5007 or by e-mail at uhirb@hawaii.edu.

You may request a copy of this document for your records.

If you agree to participate in this project please read the following electronic consent notification:

Electronic Consent

Electronic Acknowledgement of Consent:

By continuing with this instructional module I acknowledge that I have read the project description as detailed on this consent form and I agree to join in the research project entitled, *"An Instructional Module on Replacing Your Legacy Windows Operating System"*. I understand that I can change my mind about being in this project, at any time, by notifying the researcher.

Appendix C

Pre-survey

1. What is your age group?
    a. 18-25
    b. 26-35
    c. 36-45
    d. 46-55
    e. 56+
2. What is your education level?
    a. Less than a Bachelors
    b. Bachelors
    c. Masters
    d. Doctorate
    e. Professional
    f. Other (please specify)

3. Which devices do you use? (select all that apply)
    a. Smartphone
    b. Tablet
    c. Laptop
    d. Desktop

4. How do you rate yourself in regards to computer knowledge?
    a. Novice - I don't know how to turn it on
    b. Average - I can email, create word documents, watch you tube
    c. Expert - I build computers

5. Are you comfortable with installing computer software or upgrading your laptop?
    a. Not comfortable - don't want to blow it up
    b. Somewhat comfortable - will give it a try (with instructions)
    c. Very comfortable - I perform updates with my eyes closed

6. What operating system does your computer use? (select all that apply)
    a. Windows XP
    b. Windows 7
    c. Windows 8
    d. Mac OS
    e. Open Source
    f. Don't know

7. How old is your primary computer?
    a. Less than 6 months
    b. 6 months to 2 years
    c. 2 years to 4 years
    d. 4 years to 6 years
    e. over 6 years

Appendix D

Pre-test/Post-test questions (* denotes correct answer)

1. What is BIOS?
    a. Basic Internet Operating System
    b. Broadband Interface Output Source
    c. *Basic Input / Output System
    d. Biographic Information On Server

2. RAM is
    a. Radio Amplitude Modification
    b. *Random Access Memory
    c. Robotic Arm Manipulation
    d. Resource Allocation Module

3. What is Linux Mint?
    a. A new version of iOS
    b. A computer chip that compresses disk space
    c. * A Free/Open source computer operating system
    d. A high speed computer virtualization tool

4. A hard drive is
    a. The power source for a computer.
    b. *a computer data storage device
    c. Used for volatile computer memory storage
    d. Only found on desktop computers

5. CD’s and DVD’s are used for
    a. Computer drives and digital virtual drives
    b. Only recording music
    c. *Storing computer data
    d. Determining a common denominator

6. Linux operating systems are not as popular as Windows or Mac OS because
    a. It costs too much
    b. It will not work on modern computers
    c. *Many people are unfamiliar with its capabilities
    d. It is difficult to install

7. Productivity software for Linux is difficult to find
    a. True
    b. *False

8. Where can you find software for Linux
    a. Windows Store
    b. Apple Store
    c. Amazon and eBay
    d. *Software Manager in Linux

9. Linux has _____ software packages available for download. (choose one)
    a. *Over 40,000
    b. Less than 1,000
    c. Between 5,000 and 10,000
    d. Approximately 20,000

10. A *torrent* is:
    a. Computer operating frequency interference
    b. High frequency Wi-Fi generator
    c. *A computer file that transfers data using the Bit Torrent system.
    d. Excessive email traffic on a network.

11. A flash drive
    a. is a portable storage device
    b. is also known as a thumb drive
    c. comes in various storage capacities.
    d. *all of the above.

12. Computer files should be backed up
    a. only when necessary.
    b. *frequently.
    c. during a power outage.
    d. as required by law.

Appendix E

Post survey

1. How would you rate your understanding of computer hardware and software?
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor

2. Do you feel confident in your ability to upgrade your computers operating system?
    a. Very confident
    b. Confident
    c. Somewhat confident
    d. Not confident

3. If your computer were running Windows XP how likely would you convert your operating system to Linux Mint?
    a. Very likely
    b. Likely
    c. Somewhat likely
    d. Not likely

4. Prior to completing this module what other operating systems were you aware of? (check all that apply)
    a. Linux
    b. Windows
    c. Mac OS
    d. Android
    e. Chrome
    f. Ubuntu
    g. Other

5. With the instruction provided in the module how confident are you in changing your computer operating system?
    a. Very confident
    b. Confident
    c. Somewhat confident
    d. Not confident

6. How would you rate the overall layout of this module?
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor

7. Rate the instructional language of this module.
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor

8. Rate the instructional content of this module.
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor

9. Rate the content navigation of this module.
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor

References

Broady, T., Chan, A., & Caputi, P. (2010). Comparison of older and younger adults' attitudes towards and abilities with computers. *British Journal of Educational Technology, 41*(3), 473-485. doi: 10.1111/j.1467-8535.2008.00914.x

Cavanagh, S. (2013). Schools facing the expiration of Windows XP. *Education Week, (32)*(32), 1-2. Retrieved from: http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1008534&site=ehost-live

Gardner, J., Jeon, T. (2010). Creating task-centered instruction for web-based instruction: Obstacles and solutions. *Journal of Educational Technology Systems, 38*(1), 21-34. Retrieved from: http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ864506&site=ehost-live

Glass, R., (2011). On the aging of software. *Information Systems Management, 28*(2), 184-185. doi: 10.1080/10580530.2011.562402

Hernandez-Encuentra, E., Pousada, M., & Gomez-Zuniga, B. (2009). ICT and older people: Beyond usability. *Educational Gerontology, 35* (3), 226-245. Retrieved from: http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ827220&site=ehost-live

Janzen, K., Perry, B., & Edwards, M. (2011). Aligning the quantum perspective of learning to instructional design: Exploring the seven definitive questions. *International Review of Research in Open and Distance Learning, 12* (7), 56-73. Retrieved from: http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ963980

Linux Mint (2014). Retrieved from: http://www.linuxmint.com/index.php

Nagy, D., Yassin, A., & Bhattache, A. (2010). Organizational adoption of open source software: Barriers and remedies. *Communications of the ACM, 53*(3), 148-151. doi: 10.1145/1666420.1666457

Roytek, M. (2010). Enhancing instructional design efficiency: Methodologies employed by instructional designers. *British Journal of Educational Technology, 41*(2), 170-180. doi: 10.1111/j.1467-8535.2008.00902.x

Smith, M.C., Smith, T. (2010). Adults' uses of computer technology: Associations with literacy tasks, *Journal of Educational Computing Research, 42*(4), 407-422. Retrieved from: http://eres.library.manoa.hawaii.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ883934&site=ehost-live

Swann, W. (2014). The impact of applied cognitive learning theory on engagement with eLearning courseware. *Journal of Learning Design, 6* (1), 61-74. Retrieved from: http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1012886

Wang, Q. (2009). Designing a web-based constructivist learning environment. *Interactive Learning Environments, 17* (1), 1-13. doi: 10.1080/10494820701424577

Wright, G., Shumway, S., Terry, R., & Bartholomew, S. (2012). Analysis of five instructional methods for teaching sketchpad to junior high students. *Journal of Technology education, 24*(1), 54-72. Retrieved from: http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ991240